# Program Assessment and Work plan

**Program Element: Science**
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**Attachments**

- **Attachment 1: Year 3 funding**
- **Attachment 2: Active Issues**
- **Attachment 3: List of Funded Projects**
- **Attachment 4: *Science Progress-at-a-Glance***

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## Section I. Year 2 Program Assessment

The second year of the Science Program saw an expansion of activities related to peer review, performance measures, issues workshops, white papers, and conferences. Tools and strategies outlined during the first year were refined and developed in more detail (for example: the program goals were slightly reorganized to support future evaluation of the science program's progress towards meeting them). Science Program staff were increasingly called upon to provide assistance and advice to other CALFED programs, multi-agency committees working on specific issues, the IEP, and programs related to but outside of CALFED. Despite this progress, most core tasks of the program (including nominating a Science Board, initiating critical studies, conducting data analyses, and assessing CALFED-wide performance) could not be carried out during Year 2 because of contract delays.

The following presents a more detailed assessment of Year 2 activities and progress, organized by program goal.

### A. Accomplishments to Date/ Status of ROD Commitments

#### *Task 1: Oversight and Management*

Structure and activities of the Science Program: During Year 1, the Lead Scientist and Program Manager designed program goals, objectives, strategies, operational structure, staffing plans, and work plans to implement the broad goals laid out in the ROD. Year 2 was intended to be the beginning of full program implementation. Instead, most of the oversight effort during Year 2 was spent resolving contract issues and building relationships with local agencies and universities.

During Year 2, the Science Program continued to bolster its roster of core staff to assist in program administration. The Science Program also developed a comprehensive contract to secure the services of the Association of Bay Area Governments (ABAG). This contract was initiated to aid the Science, Ecosystem Restoration, and Drinking Water Quality programs in administrative functions necessary for the completion of peer reviews, communication efforts (e.g., workshops and conferences), as well as the establishment of science boards and completion of projects to address critical science

gaps. This contract was critical to Science Program implementation because much of the success of the Science Program relies on the efforts of staff and experts outside of CALFED. The contract with ABAG is also intended to further the second implementation principal in the ROD: "Local Implementation. The Agencies will promote active and strong involvement of local communities during implementation."

Because of the delay caused by contracts, the Lead Scientist and Program Manager were also able to further refine and develop several elements of the program structure and tools to help implement scientific practices throughout the programs. For example, the program goals and objectives were slightly reframed to support future evaluation of Science Program performance, and a template for developing and implementing performance measures was developed to assist each program take the next step towards integrating performance assessment into program activities.

***Task 2: Articulate, test, refine, and grow understandings about natural and human systems***

This core task of the Science Program is aimed at developing and communicating scientific information needed by CALFED.

Task 2A: Critical Unknowns

The Science Program's strategy for satisfying critical unknowns in a timely fashion is partly illustrated in the 10 generic approaches to rapidly advancing knowledge in the complex CALFED environment, as presented on Attachment C of the 2001 ERP Implementation Plan. Science needs, emphasizing needs for restoration science, were carefully integrated into the 2001 ERP PSP, based upon discussions with stakeholders, summaries from the CALFED Science Conference, and consulting with various experts including the ERP Science Board and ASET . Early in the year, the Science Program identified gaps in science needs left over from the 2000 ERP PSP, and, as described above has begun to select proposals to fill those gaps. This strategy yields what we call "science agendas."

In Year 2, the program developed science agendas for the following issue areas:

salmonids and water management (for EWA);
delta smelt and water management (for EWA);
water operations and environmental protection in the Delta;
restoration science in each of the ERP regions; and
shallow water habitat management in the Delta

Attachment 3 is a list of funded projects includes a list of studies that fall under this task. In general, some of the restoration science needs are starting to be addressed through studies selected as part of the ERP solicitation process and through the Science Program directed process (refer to Attachment 3). The Drinking Water Program also made significant investments in critical unknowns and monitoring. Most of this task, however, could not be implemented during Year 2. Some progress will be made in Year 3 as contracts become finalized, but subsequent progress will be significantly hampered by the lack of funding.

Task 2B: Implementing Regional Signature Projects

This subtask involves identifying critical information needs for explaining whether multiple program activities in an area achieved expected results, identifying what kinds of unintended effects occurred, and learning about classes of program activities. This task was not implemented during Year 2.

Task 2C: Filling Monitoring Gaps

In Year 2, Science Program staff continued to work with agency staff and local experts to identify information gaps in monitoring efforts throughout the San Francisco Estuary. A team of researchers was selected to coordinate and implement an interdisciplinary pilot wetland monitoring effort in Year 2. This team will be testing an integrated approach to the question of how restoration affects ecosystem processes at different scales in the region between San Pablo Bay and the Delta. Meanwhile, efforts within the Interagency Ecological Program were devoted to a thorough programmatic review of the IEP's Environmental Monitoring Program. Program revisions developed by technical staff were subjected to public and independent peer reviews. IEP staff continues to work to incorporate review comments and develop a synthesis of recommendations for presentation to agency management. Finally, the program published a report on indicators for Terrestrial and Amphibious Monitoring.

Task 2D: Fostering Adaptive Management

The ROD calls for implementation of CALFED actions using an Adaptive Management framework. Although this is a common goal in large programs like CALFED, AM is a challenge to fully implement. The Science Program and the Lead Scientist have participated in several forums discussing implementation of AM and sharing past experiences with implementation of the approach in other programs. The EWA and the Delta Cross Channel studies are examples of the beginnings of implementing aspects of AM in the CALFED Bay-Delta Program, especially emphasizing evaluation of existing actions with feedback mechanisms to affect future actions. Progress on both of these projects occurred in Year 2. Institutional barriers to implementing AM continued to be analyzed, and proposals are being solicited that would implement monitoring aspects of AM (e.g., retrofit monitoring to existing ERP projects). In Year 2, researchers working in collaboration with the Science Program and ERP Board members hosted a two-day workshop to discuss designs for potential large-scale AM experimental restoration projects in tidal wetlands, floodplains, and riverine habitat. The next step (underway) is to prepare written proposals for the most promising experimental restoration projects.

Science program staff also participated in the Adaptive Management Forum's review of restoration on the Tuolumne, Merced, and Clear Creek watersheds.

Task 2E: Science in Support of Management

The Program's largest investments were made in this subject area in Year 2. Over $1 million was invested in the multidisciplinary Delta Cross Channel experiments, which were focused on testing hypotheses about how fish and water flow through different operational and hydrological conditions at the Cross Channel. Additionally, the Science Program staff are actively addressing a number of issues at the request of CALFED management (see Attachment 2).

Task 2F: Analysis of Existing Data. It is not uncommon for long-term monitoring to result in a body of data that is not fully interpreted. To rapidly push forward interpretation of existing data, the Science Program has initiated a program with UC Sea Grant to solicit and support collaborative efforts among university, agency, and student/postdoc scientists who are interested in addressing critical questions about the watershed through the analysis of existing data. Year 2 efforts focused on program implementation and development of the underlying contract. Unfortunately, this contract has still not been finalized and the program is at risk of losing the talent who applied to conduct the work.

In a parallel effort, the IEP funded two such collaborative projects in Year 2.

***Task 3: Integrate the use of Best Available Scientific Understandings and Practices Throughout CALED***

Task 3A: Peer Review

Peer review is a critical step in the proposal solicitation and project selection process. Peer review is essential to ensuring the technical work conducted within and for CALFED is unbiased and authoritative.

In Year 2, the Science Program worked intensively with the ERP, the Science Board and ASET to further improve review and project selection in the ERP competitive grant process (PSP). After analyzing the previous year's progress, modifications were made in the peer review approach and the selection panel structure to further assure that project selection is unambiguously based on technical merit and incorporates a strategic vision for the ERP. Science Program staff also provided some limited advice to WUE, Watershed, and Drinking Water Quality Programs on technical review parts of PSPs. More work with these programs is needed, and the intent is to use the ERP PSP as a model for other CALFED program PSP's. Peer Review of on-going programs also continued in Year 2, including a peer review of second year work completed on the San Joaquin River dissolved oxygen problem, and Upper Yuba river studies.

The Science Program was also asked to conduct or provide advice on peer reviews of several issues/ projects. These include technical elements of the Delta Wetlands project, hatchery release methods, San Joaquin smelt migration, CALSIM model application, and ongoing work related to the Stockton Ship Channel—San Joaquin dissolved oxygen issue, hydrological models of Butte basin, and flood-related hydrologic models in the North Delta.

Finally, program staff developed written material explaining the program's techniques and strategies for designing and implementing peer reviews for different situations. These descriptions have not been published yet due to contract delays.

Task 3B: Partnerships and Collaboration

In Year 1, The Science Program played a key role in initiating the Bay-Delta Science Consortium, collaboration among university, state agencies, federal agencies and private sector/NGO institutions to work together, including mutually beneficial co-location. In Year 2, CALFED's efforts continued to focus on establishing interdisciplinary collaborations (stimulate partnerships with administrative, leadership and financial

incentives), and developing an infrastructure for information sharing. An MOU establishing the central tenants of the Bay-Delta Science Consortium is now in place and CALFED is funding an interim Consortium director position. Several ROD principles are furthered through this consortium including local leadership, public involvement, stakeholder consultation, and CALFED agency coordination.

Task 3C: Promoting Publication

In Year 2, the Science Program supported the publication of a compendium on larval fish (expected publication near the end of Year 3) and a compendium on salmon biology. The Science Program is also working with IEP to help foster publication of appropriate studies. (for the online journal, see Task 6C).

Task 3D: Enhancing Public Access to Data

A significant amount of progress was made on developing data management goals and strategies during Year 2. A data management team organized by the Bay Delta Science Consortium articulated a strategy of distributed data management systems with commonalities that would allow cross-database analyses and comparisons. Links between the databases will be made by users as data are analyzed and turned into information. This realistic yet forward-thinking strategy recognizes that: data are collected for specific purposes and attempts to bring all data into one system usually fail and users are in the best position to describe what other data sets are important for specific questions. The Science Program has adopted this strategy and recommends it for CALFED as a whole.

In addition, the Science Program funded a small project to map existing and planned wetland restoration efforts in the northern reach of San Francisco Bay.

***Task 4: Provide Authoritative and Unbiased Descriptions of the State of Scientific Knowledge***

Work under this task primarily consists of in-depth public peer review and the written descriptions of what is known about a specific issue. Both efforts provide several key pieces of information for CALFED management. They describe the relative importance of different factors affecting CALFED objectives, the level of scientific certainty regarding those factors and the links between actions and effects, define a science agenda for any specific issue (see Task 2), and articulate this information in a balanced manner.

Task 4A: Issue Workshops: A public issue workshop process was designed in Year 1 to communicate the state of scientific knowledge regarding critical and often contentious issues within the watershed, with the goal of moving participants and stakeholders toward a common view of what is known, and identification of areas where further work is needed. Science Program workshops in Year 2 covered the following topics: 1) salmonids and water management (for EWA), 2) delta smelt and water management (for EWA); 3) data management and sharing; 4) Suisun Marsh levee breach modeling comparison; and 5) water operations and environmental protection in the Delta. Science Program staff continues to respond to numerous requests to complete future workshops and discussions by experts to evaluate critical issues (see Attachment 2). We expect workshop activities will remain an important part of the Science Program's contribution to

furthering the science basis of other CALFED Programs. All workshops are open to the public and incorporate opportunities for comment.

Task 4B: White Papers
White papers synthesize and present what is and what is not known on a particular issue. They are written by leading experts in specific fields, subject to expert peer review, and to public comment. The program initiates white papers in response to requests from the CALFED community to engage in a specific issue when a white paper is judged to be the appropriate tool. In Year 2, the Science Program initiated a number of white papers and supported the completion of others begun by the ERP Independent Science Board. These include: system wide sediment budget and implications of restoration, geochemical and microbial processes affecting arsenic risks in groundwater drinking water supplies, climate change and hydrological conditions, and delta smelt ecology.

### *Task 5: Evaluate Technical Performance of CALFED Bay-Delta Program*

Task 5A: Science Board: In Year 1, the Lead Scientist developed an organizational structure and charge for the CALFED-wide Science Board and subject area boards based on structures used in other advisory panels and on feedback from the ERP Science Board. In June 2001 the Management Group approved a modification to the ROD commitment allowing the Lead Scientist to nominate board members in a rolling process. In Year 2, the Science Program could not nominate any Board member due to contract delays.

The Science program staff is also providing advice to individual CALFED programs on the roles, structure, and function of independent "mini" boards that will provide program-specific scientific advice and guidance on an ongoing basis. The Program staff is currently working with WUE, the Levees Program, and the Drinking Water Program and hope to be able to expand those efforts in Year 3.

Task 5B: EWA Review: The ROD requires the Lead Scientist to complete a review of the Environmental Water Account Program, one of CALFED's signature activities. Activities in Year 1 focused on establishing the process and infrastructure to complete a thorough and independent review of EWA implementation including the establishment of a standing review panel. Led by the Lead Scientist, this panel conducted a thorough review of year one EWA implementation in October 2001. The two science advisors brought in during Year 1 continued to track EWA events in Year 2 and provide status reports to the Lead Scientist. In addition to tracking the technical aspects of the EWA the Lead Scientist also spent time in Year 2 addressing the role and purpose of Science Program involvement in the EWA. Numerous discussions occurred between Science Program, Management Agency, and Project Agency staff and managers regarding the purpose and scope of Science Program involvement in the EWA. These efforts will likely continue in Year 3 as both the Science Program and the EWA continue to evolve.

Task 5D: Performance Measures and Indicators:

In Year 1, the Science Program began developing templates for defining and using performance measures within and across individual programs. Science Program staff also worked with CALFED program managers to refine the template for selecting

performance measures for each individual program. In addition, the Lead Scientist defined the strategy the Science Program will use to assess CALFED actions across programs and at the system-wide scale. Efforts in Year 2 focused on the development of written descriptions of performance measures for the ERP.

In addition to working with each individual program, the Science Program began the process of developing a conceptual model for evaluating CALFED-wide effects on supply reliability. A consultant was hired to map out different indicators and metrics of reliability used in both planning and operations at all scales in the state, ranging from individual utilities and water districts to the state and federal projects. The current focus is on documenting the indicators and metrics of reliability currently used by project operators. Once this project is completed in Year 3, the Science Program will seek comments from the Management Group and BDPAC on next steps for evaluating program wide performance relative to supply reliability.

Finally, the Lead Scientist is currently in the process of discussing an external review of Science Program by a National Academy of Sciences panel. We expect the review to consider and advise the program on issues such as the structure of boards and panels, the balance and credibility of reviews, and general program activities. The current plan is for this review to take place in spring of 2003.

***Task 6: Establish and Improve Communication Pathways Between Science, Management, and Public Communities***

Task 6A: Conferences:

In Year 2, the CALFED Science Program joined forces with the San Francisco Estuary Project to complete the biannual State of the Estuary Conference (October 2001). Over 200 people attended the conference, and scientists working throughout the program presented the latest information from their projects either orally or as part of the poster session. The co-sponsorship of this conference is intended to encourage communication of CALFED-wide science activities through this venue every other year. In addition, planning for the next CALFED Science biannual conference (January 2003) also began in Year 2. The Science Program also co-sponsored the Pacific Climate Workshop, the American Fisheries Society meeting on Larval Fish, the Lower American River Conference, and the Society of Environmental Toxicology's 2002 conference.

Task 6B: Educational Material:

In Year 2, the Program supported the development of two educational videos, one focused on graphically depicting Delta tidal flows, and the other on multidisciplinary team field research.

Task 6C: Online Science Journal

In Year 2, the Science Program initiated a new online technical journal intended to serve as a peer-reviewed publication mechanism for any research related to water and ecosystem management in the Bay-Delta watershed. While the early emphasis will be on scientific studies, articles that apply existing knowledge in the region, as well as social science research such as consumer response to water conservation rebate

programs will be accepted. The current plan is for the University of California digital library project to house the journal (free public access) and for the first issue to be available in the middle of Year 3.

Task 6D: Fact Sheets

In Year 2, the Science Program continued to support the "Science in Action" in the existing Estuaries newsletter. The first issue of Science in Action highlighted the Delta Cross Channel studies and was a resounding success. Another issue highlighted findings about wetland restoration in the Delta, and work progresses on a third issue focusing on physical and ecological processes in Suisun Bay.

Task 6E: Science Program Activity Reports

Science Program staff has been working on a number of different products to communicate both the structure of the program and its progress. A comprehensive web page is almost ready for initial publication. All written documents relating to workshops and reviews have been posted on the current web page. The Science Program has made presentations to different audience through the year that have illustrated the value of investments like the Delta Cross Channel studies, studies of Breached Island restoration in the Delta, studies or restoration on floodplains, and studies of fish recovery in the rivers. Some of CALFED's science advances are highlighted in the 2001 ERP Implementation Plan. With a technical editor now on staff and contracts finally in place, we expect full publication of this information in Year 3.

## B. Program delays

Major delays in virtually all Science Program activities occurred during Year 2, due to delays in spending authority for State funds and substantial delays in contracting. In addition, severe restrictions on the expenditure of State general funds and a general freeze on hiring beginning in October, 2002 created further impediments to program progress. 11 of the 17 Science Program contracts started in Year 2 are still pending.

The overall effect of these program delays was to push planned Year 1 and 2 activities into Years 3 and 4. As a result, studies intended to develop new information needed by CALFED to address uncertainties and evaluate program performance will largely not get under way until Year 3.

The limited availability of funds in Year 3 will result in another gap in program activity in Years 4 and 5. Few if any of these activities can be carried forward. The current Year 3 budget is allocated to a wetland monitoring collaborative study designed during Years 1 and 2, a limited number of reviews (including the EWA review and a National Academy of Sciences panel review), and supporting CALFED, CDFG, and DWR program staff.

## Section II. Year 3 Work Plan

The tasks identified as Year 3 in this work plan are those which will be accomplished with funds in the Year 3 budget. Other activities that were planned for Years 1 and 2 and delayed due to contract issues will also be in progress.

### A. Year 3 Tasks and Schedule

***Task 1: Oversight and Management*:** In Year 3, the Science Program will continue to staff three key program-wide support areas. A business manager will be hired to oversee all fiscal aspects of the program including further integration of Science Program tracking into the overall CALFED tracking system and process**.** In addition, staff will initiate publication of program information on the web, and continue developing performance measures and assessment of science program activities.

Science Program staff will also continue to provide support and guidance to all CALFED programs in implementing science elements within programs, initiate and manage work conducted under the tasks listed below, and give regular presentations to the CALFED community on program progress and specific review issues.

***Task 2: Articulate, test, refine, and grow understandings about natural and human systems:*** This core task of the Science Program is aimed at developing and communicating scientific information needed by CALFED.

Task 2A: Critical Unknowns

During Year 3, the Science Program will issue an RFP for broad uncertainties about the relationship between fish screens and the immediate and regional ecological environment in the Delta (Prop 13 funds). Uncertainties include issues such as predation rates immediately in front of facilities for different species under different conditions and in-depth analyses of salvage information to confirm and identify relationships with hydrological and environmental conditions (i.e. night/ day, temperature, etc.). Grants should be awarded by January, 2003.

Task 2B: Implementing Regional Signature Projects

The Science Program's priority for Year 3 is to develop a science agenda for multiple program activities in the Delta. This subtask involves identifying critical information needs for explaining whether multiple program activities in an area achieved expected results, identifying what kinds of unintended effects occurred, and learning about classes of program activities.

Task 2C: Filling Monitoring Gaps

There are two Year 3 priorities for monitoring. The first is to fund a pilot wetland monitoring effort that the Science Program has spent Years 1 and 2 building a team to execute. The second will be to maintain high priority long-term data sets critical for assessing CALFED program performance by allocating small amounts of science program funds to existing programs that have been cut or are facing cuts which would prevent data collection.

Task 2D: Fostering Adaptive Management

In Year 3, Science program staff will continue to support the incorporation of monitoring, assessment, and critical studies within each program areas. This will include facilitating study programs recommended during Adaptive Management Forum's review of restoration on the Tuolumne, Merced, and Clear Creek watersheds.

Task 2E: Science in Support of Management

Science Program staff will continue to actively address a number of issues at the request of CALFED management (see Attachment 2); however, there is not sufficient funding to initiate new studies in support of management.

Task 2F: Analysis of Existing Data.

Projects that were funded in previous years to conduct analyses of existing data will be starting to produce results in Year 3. Science Program staff, advisors, and reviewers will continue to make recommendations on analyses and data gaps.

***Task 3: Integrate the use of Best Available Scientific Understandings and Practices Throughout CALED***

Task 3A: Peer Review

In Year 3, the Science Program will continue to work with other programs on peer review related to PSPs, publish the guidance it has developed, and conduct reviews of integrated efforts such as the San Joaquin River dissolved oxygen problem, Upper Yuba river studies, and mercury studies (see Attachment 2).

Task 3B: Partnerships and Collaboration

In Year 3, The Science Program will continue to work the IEP and the Bay Delta Science Consortium to promote partnerships and collaboration. Funding will limit supported activities to small events such as workshops and discussions about data.

Task 3C: Promoting Publication

In Year 2, the Science Program supported the publication of a compendium on larval fish (expected publication near the end of Year 3) and a compendium on salmon biology. The Science Program is also working with IEP to help foster publication of appropriate studies. (For the online journal, see Task 6C). The Science Program staff is offering periodic training workshops for scientific writing to any appropriate member of the CALFED community.

Task 3D: Enhancing Public Access to Data

During Year 3, CALFED agency staff and Consortium participants will be holding a series of workshops on data management issues, including agreeing on consistent nomenclature. The Science Program will be asking appropriate agency staff and funded project proponents to participate.

### *Task 4: Provide Authoritative and Unbiased Descriptions of the State of Scientific Knowledge*

Work under this task primarily consists of in-depth public peer review and the written descriptions of what is known about a specific issue. Both efforts provide several key pieces of information for CALFED management. They describe the relative importance of different factors affecting CALFED objectives, the level of scientific certainty regarding those factors and the links between actions and effects, define a science agenda for any specific issue (see Task 2), and articulate this information in a balanced manner.

Task 4A: Issue Workshops: During Year 3, the Science Program will conduct and support a number of issue workshops using funding from Years 1 and 2. Requests have been made for assistance on a wide range of issues (see Attachment 2); some of these will be addressed by workshops. The actual number will depend on a number of factors, including staff availability, the availability of an appropriate workshop organizer (scientific background, experience with reviews, familiarity with experts in the field, time availability), funding availability, and the existence of appropriate written material to review, etc.), timeliness of issue, and commitments from programs to invest in and respond to some of the recommendations. By spring of 2003, funds for this activity will be exhausted.

Task 4B: White Papers
White papers synthesize and present what is and what is not known on a particular issue. They are written by leading experts in specific fields, subject to expert peer review, and to public comment. The program initiates white papers in response to requests from the CALFED community to engage in a specific issue when a white paper is judged to be the appropriate tool. In Year 3, the Science Program will continue progress with white papers begun in Years 1 and 2, but will not initiate new white papers until additional funding becomes available.

### *Task 5: Evaluate Technical Performance of CALFED Bay-Delta Program*

Task 5A: Science Board: During Year 3, the Science Program will continue discussing a review role for a National Academy of Sciences panel with NAS staff, ERP Science Board and other expert review panel members. The Lead Scientist will also nominate the first set of CALFED Science Board members.

Task 5B: EWA Review: The Science Program will conduct the second annual review of the EWA during year 3.

Task 5D: Performance Measures and Indicators:

During Year 3, the Science Program will continue working with staff within each CALFED Program on the development and implementation of performance measures. Funding for this work is carry-over from Years 1 and 2. Continued progress will depend on allocation of funds for performance measures within each program budget in Year 3.

After the draft conceptual map of current indicators and metrics used to assess supply reliability at different levels of aggregation in the state is complete, the Science Program

will seek input from the Management Group and BDPAC on next steps for evaluating program wide performance relative to supply reliability.

Finally, the Lead Scientist is currently in the process of discussing an external review of Science Program by a National Academy of Sciences panel. We expect the review to consider and advise the program on issues such as the structure of boards and panels, the balance and credibility of reviews, and general program activities. The current plan is for this review to take place in summer/ fall of 2003.

***Task 6: Establish and Improve Communication Pathways between Science, Management, and Public Communities***

Task 6A: Conferences:

Although the next CALFED Science Conference is planned for January 2003, no funds are currently available from Year 3 to support a science element in the 2004 State of the Estuary Conference (SOE). Project proponents and CALFED agency staff will continue to be encouraged to submit and present results and organize discussions of scientific issues at the SOE Conference, but space and time will be limited.

Task 6B: Educational Material:

There are no Year 3 funds budgeted for educational material.

Task 6C: Online Science Journal

The online journal is scheduled to launch its inaugural issue in the fall of 2003. Program staff are funded to ensure ongoing publication, although after carryover funds from Years 1 and 2 are exhausted, the managing editors and peer review can not be supported.

Task 6D: Fact Sheets

During the next 12 months, the Science Program plans to publish at least two fact sheets on new scientific knowledge on CALFED issues. The next issue will focus on river restoration. No Year 3 funds are available to continue this work.

Task 6E: Science Program Activity Reports

During Year 3, the Science Program plans to publish all of its program documentation on the web, refine briefing materials on the program and specific accomplishments, and to refine its fiscal and progress tracking system. These products will be partially carried out by staff and partially by activities funded from Years 1 and 2 budgets.

## B. Category A and B Programs/Funds

These are the Science Program's Category A and Category B Programs by Agency and Funding Source.

| Agency | Category A<br>Programs (Funding Source) | Category B<br>Programs (Funding Source) |
|---|---|---|
| **CBDA** | DWR Program 15 FY 01-02 BCP (GF) | |
| | DWR Program 15 FY 02-03 BCP<br>(Prop 13, Ch 9, Art 3 - Bay-Delta Multi-purpose Water Management) | |
| | Prop 50, Ch 7, Section 79550 (a-g) | |
| **DWR** | Program 20 FY 01-0 BCP (GF) | |
| | Interagency Ecological Program (SWP) | |
| | Prop 50, Ch 7, Section 79550 (e) | |
| **DFG** | Program 20 FY 01-02 BCP (GF) | |
| | Interagency Ecological Program | |
| | DWR Program 15 FY 02-03 BCP (Prop 13, Ch 9, Art 3 – Bay-Delta Multi-purpose Water Management) | Salmon and Steelhead Assessment /Monitoring Program (GF) |
| | Prop 50, Ch 7, Section 79550 (e) | |
| **SWRCB** | Interagency Ecological Program | |
| **USACE** | Interagency Ecological Program | |
| **USBR** | | Central Valley Assessment/Monitoring Program (CAMP) (RF) |
| | Interagency Ecological Program (WRR, RF) | |
| **USEPA** | Interagency Ecological Program | |
| **USFS** | | Pacific Southwest Forest & Range Research Program |
| **USFWS** | Interagency Ecological Program | |
| **USGS** | CALFED Bay-Delta Program Support | |
| | | Monitoring Programs in the Bay-Delta System |
| | Interagency Ecological Program | |
| **NMFS** | Interagency Ecological Program | |

## C. ROD Implementation Commitments

The above discussion incorporated both the specific ROD commitments for the Science Program (nominating a Science Board, preparing an annual report, and reviewing the EWA), and provides a more detailed and structured work plan and assessment for the general ROD commitments, including development and implementation of performance measures.

The following is a snapshot of the Science Program's progress towards meeting both specific and general ROD commitments, and the projected progress for Year 3.

See Attachment 4, Science Progress at a Glance

## D. Management Group

Major activities we expect to bring before the Management Group include the role of an National Academy Panel, a package of research projects recommended for funding related to fish screens in the Delta (Prop 13), and a package of collaborative research projects recommended for funding by the Bay Delta Consortium (Years 1 and 2 SB 23 funds). We also expect to continue discussions about the integration of science into each individual program, report on major reviews, and updates on specific issues.

## E. Public Participation

The Science Program gives regular briefings to BDPAC on status, planned activities, and requests input on major issues such as outside review of the Science Program by a National Academy of Sciences panel.

During Year 3, program staff plans to expand briefings and discussions about science program activities to regional groups. An open invitation has been issued to members of the Environmental Justice community to request Science Program involvement in issues.

**F. Agency participation**

Science Program staff relies on ongoing agency participation and coordination during program implementation. The Lead Scientist, Program Manager, and science advisors routinely participate in the Water Operations Management Team and ASET. The Program Manager is a member of the Interagency Ecological Program Coordinators (a consortium of State and Federal Agencies). All of these activities are expected to continue in Year 3.

**G. Science Review**

The templates and tools developed by the Science Program for incorporating science throughout all program areas will be published as program documentation during Year 3 on the web.

**H. Budget by Task** See Attachment 1

## Section III. Stage 1

A. Stage 1 Projected Expenditures

No changes proposed to 7 year totals.

B. State, Federal, Local/Water User Cost Sharing

Cost sharing in the Framework agreement is for 50/50 state: federal funding. We are not recommending local cost share because independence is a key element of the science program.

The Interagency Ecological Program has a significant amount of cost sharing. This information is presented in the funding tables.

**Science Program Assessment and Work plan**
**Year 3**
**Executive Summary**
**December 1, 2002**

This summary highlights two aspects of the Science Program's substantive activities for Year 3 (many of which follow actions begun in Year 2): priority issue areas, the relationship between CALFED-wide science activities undertaken by the program and science activities needed within each program area.

## Priority Issues For Year 3

The Science Program has been and will continue to focus on the following issue areas during Year 3:

- Water Operations and Biology in the Delta—science issues
- Performance Measures
- Signature Adaptive Management Projects
- Improving Monitoring Capabilities
- Restoration Science--Adaptive Management Approach
- Collaborative Science—Bay Delta Science Consortium
- Ongoing program communication
- Science within CALFED Programs

The Program is using a similar approach to integrate science into the above issues and actions as we are recommending that each program use to strategically fill critical unknowns and evaluate program performance. Key questions are first identified by staff, stakeholders and key science advisors. These questions express the most basic assumptions about the issue or program. Experts are then used to help express the status of knowledge and key scientific uncertainties associated with those questions. White papers, workshops, standing panels or ad hoc technical review panels are tools available to establish a flow of information to clarify what is known and unknown about the issue or questions. Reviews of progress in the project can also take this form. CALFED staff and selected expert advisors then produce an agenda of scientific needs (as in the ERP Annual Plan) and a PSP that solicits studies to help fill those needs. Studies are selected using a peer review process and funded. Results are fed back to managers and CALFED staff via publications, white papers, workshops, seminars and the CALFED Science Conference. On-going review by expert panels is a critical ingredient in evaluating progress. Adaptive feedback is accomplished by making all review outcomes public and using recommendations to advance the progress on the issue, program or project (e.g. Environmental Water Account). This approach is outlined in Figure 1 and has been provided to all individual programs. A detailed list of activities and studies, for each issue, and planned for Year 3, is attached to this summary (Attachment A)

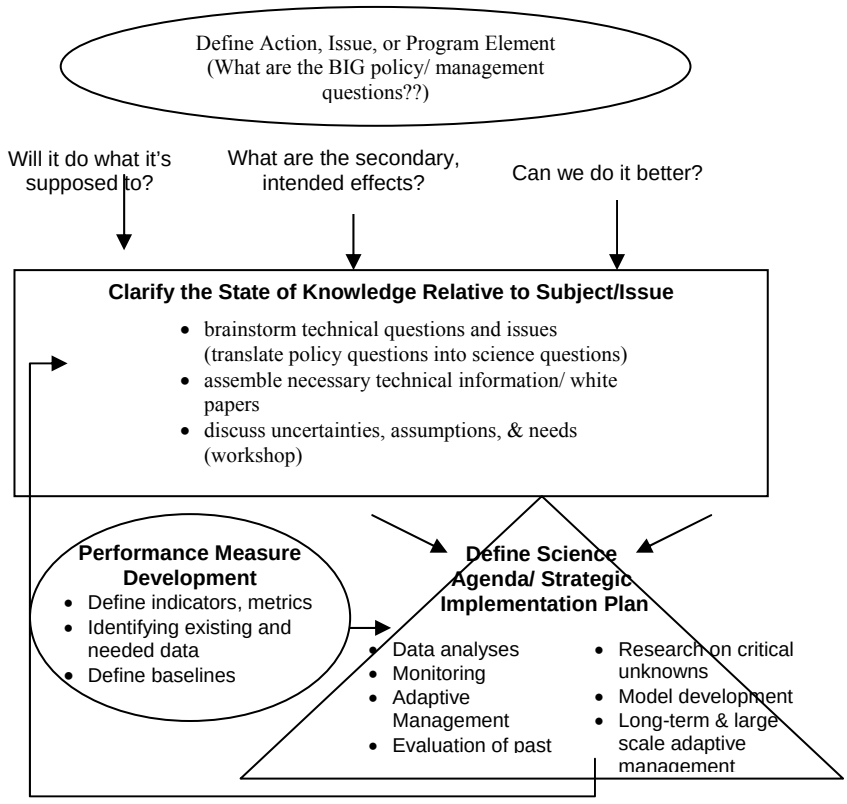



Figure 1: Adaptive Approach for Integrating Science Across Issues and Programs

The status of scientific activity in each of the different issue areas ranges from those where questions are just being identified (Battle Creek), to where an information flow and review strategy is established and a strategic plan is being developed (Delta issues and performance measures), to issues where studies that implement that plan are underway (restoration science).

**Science Across CALFED and Science Within Each Program**

The Science Program is focusing on large-scale issues that cut across multiple program elements and regions. Within each program area, however, there are also specific science and project technical needs including:

- peer review of specific study designs, proposals submitted through PSPs, and final technical products
- balanced and unbiased descriptions of the state of science relative to a specific issue
- identifying critical unknowns needed to assess program performance or define classes of activities needed to reach program goals; and
- specific data analyses and monitoring needed to support performance assessment

For example, the storage program is applying these scientific approaches to ensure its feasibility and environmental impact studies use the best available scientific information and to identify the strengths and weaknesses of one of its core tools (CALSIM II model). The drinking water program is applying these approaches to develop a monitoring strategy that will feed into an overall assessment of program performance.

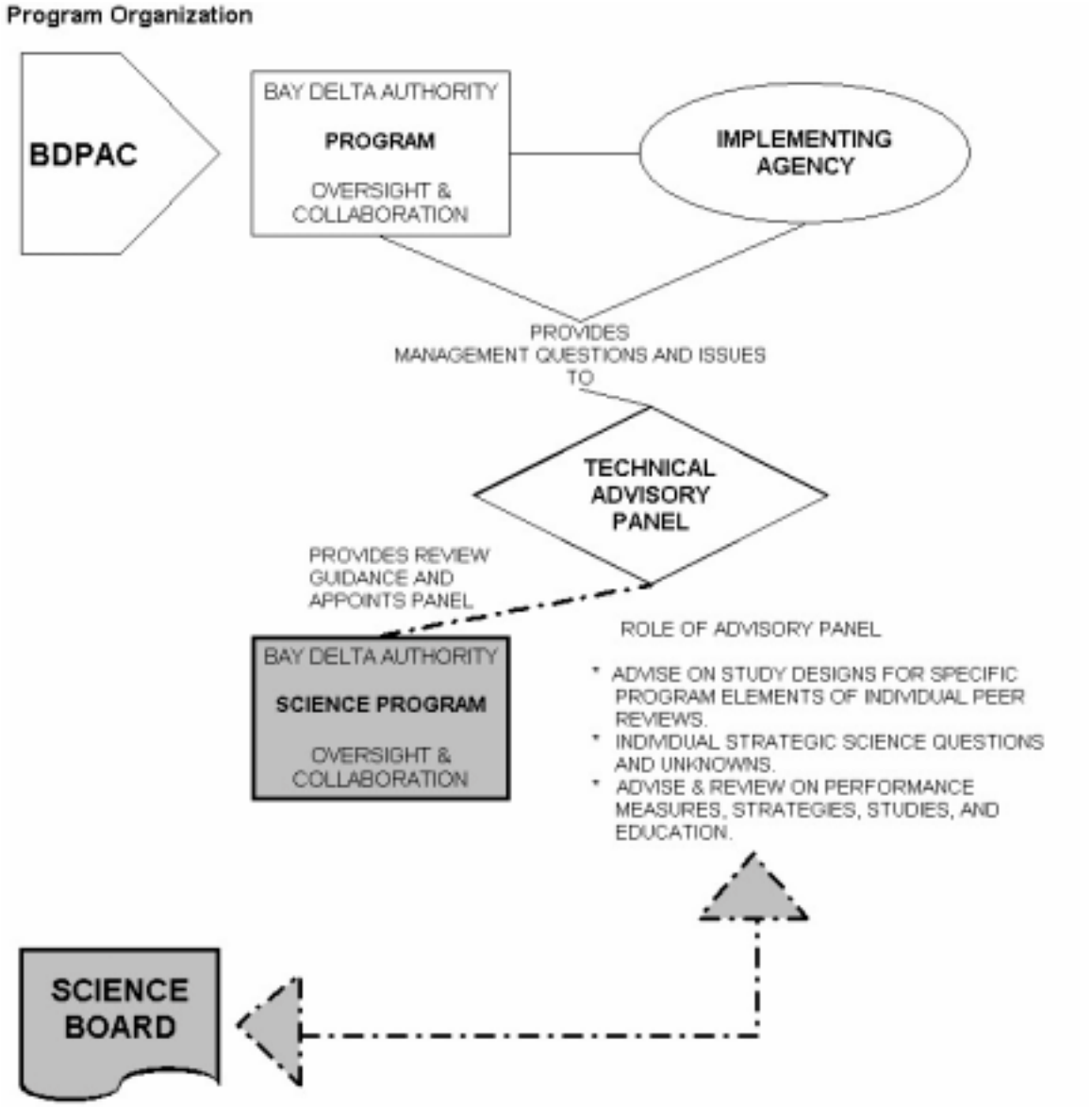
A summary of scientific tasks currently being undertaken by individual programs is listed under "Program-Specific Science" in Attachment A.

The following table outlines the distinction between the scientific activities that will be supported and carried out by the Science Program, and those that should be carried out within individual programs.

| Science Program | Individual Programs |
|---|---|
| CALFED wide Science Board, expert panels examining cross-program issues and studies, NAS reviews of science throughout CALFED | Support Program-specific science advisors |
| Conduct reviews of programs, large-scale activities cutting across program areas, advise on peer review in PSPs, and facilitate inclusion of outside experts | Conduct peer review of specific studies and tools, include peer review in PSP selection process |
| Develop science agendas for cross-cutting issues, implement agendas by Fund regional and large-scale monitoring gaps, signature projects, intensive multidisciplinary studies, and research aimed at building knowledge | Develop strategic science agendas specific to program assessment, fund studies and monitoring to implement agendas |
| Support multiple communication tools and arenas, including online journal, science conferences and forums | |

The science advisors appointed to work with each program (collaboration between the program and CALFED Science Program to determine who and help frame their charge) will be integrated into the overall structure of standing expert panels and Science Boards.

Program Organization




Science Organization

## Attachment A: Summary of Science Activities: Year 3

**Water Operations and Biology in the Delta: Science Issues**

- Studies & Monitoring Underway
    - Effects of toxicants on juvenile salmon—reconnaissance study in south delta to see if effects can be detected
    - Fundamental hydrodynamic and transport mechanisms in the Delta
    - Genetic identification methods for spring run Chinook salmon in the Sacramento watershed
    - Replaced in-situ flow monitoring equipment in the Delta
    - The spatial ecology and population dynamics of Delta Smelt revealed by otolith biogeochemistry
    - Delta Cross Channel studies (funded initial year, cost-shared with Conveyance Program)
    - IEP fish presence, abundance, and location data—identifying patterns and controlling processes
    - Interpretation of larval fish data: Sponsored symposium and edited publication of papers
- Workshops and Reviews
    - Water Management workshop: population-level effects
    - Salmon and EWA water management workshop
    - Delta smelt workshop
    - Evaluate implications of climate variability and climate change for water management and proposed CALFED Actions
    - Review of Delta Cross Channel proposals and progress
    - Workshop on Resource valuation
    - Develop synthesis of knowledge relevant to converging issues on water operations and environmental management in the delta and hold related workshop(s).
    - EWA Technical Review
        - Convene annual review by independent panel and issue report
        - Publish summaries of year's activities, justifications and summaries of workshops
- Science Agendas and White Papers
    - Delta smelt research agenda—sponsored development of a multi-organization IEP project work team and complete agenda for science needs both for IEP and for PSP.
    - Complete Delta Smelt white paper
    - Complete Salmonid white paper
    - Improving science underlying water operations: initiate process of selecting and starting studies using science agenda developed in Year 2 as basis for PSP
    - Determining effectiveness of Delta fish screens in the broader ecosystem context: initiate PSP and select studies to improve science linking take to ecosystem conditions and populations

**Performance Measures**

- Expand to a white paper the philosophy, process and formats used for CALFED performance measures.
- Produce annual report on progress in developing performance measures for CALFED and CALFED programs
- Using ERP as a model, characterize and justify metrics, and interpret trends, in an initial set of key indicators.
- Began development of a conceptual model for evaluating changes in supply reliability at different scales associated with CALFED actions
- Providing expert advisor to help each program develop and use performance measures
- Establish peer review process for selection of indicators and written explanations.

**Signature Adaptive Management Projects**

- Stockton Ship Channel:
    - Studies & Monitoring Underway:
        - Development of long-term hydrological models in support of dissolved oxygen management in Stockton ship channel and San Joaquin river
    - Workshops and Reviews:
        - Expert panel for multidisciplinary review of Delta projects linked to flow and water quality changes (San Joaquin River DO)
- Battle Creek
    - Begin science advisory process
    - Panel discussion of state of Science

**Improve Monitoring Capabilities**

- Complete aquatic monitoring white paper
- Analyses of under-exploited monitoring data
    - Collaborate with CA Sea Grant to solicit, select and fund proposals for postdoctoral research in several issue areas
    - Collaborate with IEP to integrate peer review into the proposal-work plan development and selection process
- Review of Collection, handling, trucking and release studies for Delta smelt (associated with salvage from diversion facilities).
- IEP-SAG review of salmon monitoring
- Replaced old real-time flow monitoring equipment in Delta
- Wetlands
    - Co-sponsor research on indictors linking toxicants to wetland ecological health- UC Davis
    - Pilot Wetlands Monitoring—organize multidisciplinary team to develop methods and conduct integrated monitoring of restoration sites from San Pablo Bay to the Delta

**Restoration Science: An Adaptive Management Approach**

- Studies and Monitoring Underway: Science Program-sponsored
  - Ecological evaluation of Yolo bypass to support floodplain restoration
  - Heavy metal and mercury concentrations in bed sediments and floodplains of clear creek watershed
  - Invasive species in ports and harbors
  - Developing a flow and sediment transport model for channel and floodplain restoration on the Sacramento river
- Workshops and Reviews
  - Supporting statewide strategic science plan for mercury studies & coordination of CALFED mercury studies
  - In stream flow modeling workshop (Year 2)
  - Support implementation of recommendations from ERP Science Board's adaptive management workshop
  - Support ongoing expert panel review of Upper Yuba River studies
  - Workshop on floodplain restoration

- Science Agendas and White Papers
  - Sediment budget and controlling processes throughout the watershed—putting restoration plans in the context of sediment availability
  - White paper: Progress in Delta restoration
  - Update science agendas on restoration science in each ERP region;
  - Follow up on science agenda for shallow water habitat management in the Delta

**Creation of a Bay-Delta Consortium for Collaborative Science**

- Provided staff and start-up funds for the Bay Delta Science Consortium, including planning co-location of DWR, CDFG, USFWS, and USGS scientists and field staff
- Developing criteria for collaborative proposals
- Discussing a collaborative focus on Suisun Marsh

**Communication**

- Initiated development of communication strategy for the Science Program
- Conferences
  - 2nd CALFED Science Conference, Sacramento, January 2003
  - Co-Sponsoring 2003 State of the Estuary Conference
  - Co-Sponsoring Pacific Climate Conference 2002
  - Co-Sponsoring Society of Environmental Toxicology and Chemistry Conference, 2002
  - Co-Sponsored AFS Early Life History Meeting, 2003
  - Co-Sponsoring American River Conference, 2002
- Educational Material
  - Scientific studies in the Delta--video
  - Water Education Foundation Delta Flow Video
- Online Science Journal

- Funded the development of a new online series devoted to publication of scientific studies on water issues in California; journal editors have accepted two manuscripts for review and the digital publication process is starting

- Fact Sheets
  - *Science in Action*: Delta Cross Channel studies fact sheet published in *Estuary*
  - *Science in Action*: Delta shallow water habitat fact sheet published in *Estuary*
  - River restoration fact sheet in progress
- Science Program Activity Reports (selected examples)
  - Presentation at Estuarine Research Federal conference on adaptive management experiments within CALFED Bay-Delta Program
  - Briefed US GAO on the structure of the Science Program
- Web Site: Initiated development of Science Program web site

## Program Specific Science

**NOTE: This section is being reviewed by each program manager. The review may result in changes or additions to this section.**

- Levees
  - Delta island subsidence and accretion (cost share with DWR)
  - Shallow water habitat science agenda
- Drinking Water Quality and Environmental Water Quality
  - Delta water quality: analysis of existing data to establish a baseline water quality (cost-shared with Drinking Water Program)
  - Share in developing independent science review process for PSP
  - Developing conceptual models and monitoring strategy
  - Performance measures under development
  - Funded studies
- Ecosystem Restoration Program
  - Update peer review process in PSP (ERP)
  - Fund ~$10M scientific studies to support restoration, selected in competitive process
  - Begin performance measures
  - Adaptive Management forums: Merced, Clear Creek, Tuolumne
  - Sustain science advisory board (Independent Science Board-ISB)
  - Brown-bag science/restoration seminars every month
  - Planning adaptive management experiments with ISB
  - Support science blueprint from Prop. 204
  - Statewide mercury study strategy
  - Begin studies of feasibility of restoring salmonids to Upper Yuba
- Conveyance
  - Co-sponsored peer review of north Delta flood models with Levee Program
  - Advising on technical panel for Through Delta Facility studies
  - Supporting adaptive management Delta cross channel studies
- Storage
  - Continue review of portions of the Delta Wetlands technical studies
  - Initiating Process to peer review CALSIM and its applications

- WUE
  - Providing advice to WUE on defining the role of an external science review committee
- Water Management
  - Arsenic White Paper—geochemical and microbial processes, drinking water use, and potential conjunctive use issues (Water Management)
  - Butte Basin ground water and linked models (peer review and advise on process)
- Science
  - Engaged in discussions with the National Academy of Sciences and developed plans for a review of the Science Program in spring, ’03 (Science Program)

**ATTACHMENT 1**

**Science Workplan - CALFED Program Year 3**
**($ in thousands)**
**December 1, 2002**

| Science | CALFED | DWR | DFG | State Subtotal | USBR | USGS | Other Federal Agencies [3] | Federal Subtotal | Local/User [2] | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Oversight and Management | $100 | $0 | $0 | $100 | $0 | $473 | $0 | $473 | $0 | $573 |
| Fund Source | | | | | | | | | | |
| General Fund | $100 | | | $100 | | | | $0 | | $100 |
| Prop 13 | | | | | | | | | | |
| Prop 204 | | | | $0 | | | | $0 | | $0 |
| Other Federal Funding | | | | | | $473 | | $473 | | $473 |
| 2. Articulate, test, refine & growth understanding | $3,712 | $261 | $235 | $4,208 | $0 | $0 | $0 | $0 | $0 | $4,208 |
| Fund Source | | | | | | | | | | |
| General Fund | $1,682 | $261 | $235 | $2,178 | | | | $0 | | $2,178 |
| Prop 13 | $2,030 | | | $2,030 | | | | | | |
| Prop 204 | | | | $0 | | | | $0 | | $0 |
| 3. Integrate best available science | $188 | $0 | $0 | $188 | $0 | $103 | $0 | $103 | $0 | $291 |
| Fund Source | | | | | | | | | | |
| General Fund | $188 | | | $188 | | | | $0 | | $188 |
| Prop 13 | | | | $0 | | | | $0 | | $0 |
| Prop 204 | | | | $0 | | | | $0 | | $0 |
| Other Federal Funding | | | | | | $103 | | $103 | | $103 |
| 4. Provide authoritative description of state of knowledge | $25 | $0 | $0 | $25 | $0 | $131 | $0 | $131 | $0 | $156 |
| Fund Source | | | | | | | | | | |
| General Fund | $25 | | | $25 | | | | $0 | | $25 |
| Prop 13 | | | | $0 | | | | $0 | | $0 |
| Prop 204 | | | | $0 | | | | $0 | | $0 |
| Other Federal Funding | | | | | | $131 | | $131 | | |
| 5. Evaluate Technical performance | $100 | $0 | $0 | $100 | $0 | $48 | $0 | $48 | $0 | $148 |
| Fund Source | | | | | | | | | | |
| General Fund | $100 | | | $100 | | | | $0 | | $100 |
| Prop 13 | | | | $0 | | | | $0 | | $0 |
| Prop 204 | | | | $0 | | | | $0 | | $0 |
| Other Federal Funding | | | | | | $48 | | $48 | | $48 |
| 6. Communication | $60 | $0 | $0 | $60 | $0 | $15 | $0 | $15 | $0 | $75 |
| Fund Source | | | | | | | | | | |
| General Fund | $60 | | | $60 | | | | $0 | | $60 |
| Prop 13 | | | | $0 | | | | $0 | | $0 |
| Prop 204 | | | | $0 | | | | $0 | | $0 |
| Other Federal Funding | | | | | | $15 | | $15 | | $15 |
| 7. Interagency Ecological Program - Research & Monitoring | $0 | $6,223 | $1,828 | $8,051 | $5,250 | $622 | $1,035 | $6,907 | $197 | $15,155 |
| Fund Source | | | | | | | | | | |
| General Fund | | | $625 | $625 | | | | $0 | | $625 |
| SWP | | $6,223 | | $6,223 | | | | $0 | | $6,223 |
| Other State Funding [1] | | | $1,203 | $1,203 | | | | $0 | | $1,203 |
| Water & Related Resources | | | | $0 | $4,000 | | | $4,000 | | $4,000 |
| Other Federal Funding | | | | $0 | | $622 | $1,035 | $1,657 | | $1,657 |
| CVPIA/RF | | | | $0 | $1,250 | | | $1,250 | | $1,250 |
| Matching | | | | $0 | | | | $0 | $197 | $197 |
| Program Summary: CALFED Science and Category A (IEP) | $4,185 | $6,484 | $2,063 | $12,732 | $5,250 | $1,392 | $1,035 | $7,677 | $197 | $20,606 |
| Fund Source | | | | | | | | | | |
| General Fund | $2,155 | $261 | $860 | $3,276 | | | | $0 | | $3,276 |
| SWP | $0 | $6,223 | $0 | $6,223 | | | | $0 | | $6,223 |
| Prop 13 | $2,030 | | | $2,030 | | | | $0 | | $2,030 |
| Prop 204 | | | | $0 | | | | $0 | | $0 |
| Other State Funding [1] | | | $1,203 | $1,203 | | | | $0 | | $1,203 |
| Water & Related Resources | | | | $0 | $4,000 | | | $4,000 | | $4,000 |
| Other Federal Funding | | | | $0 | | $1,392 | $1,035 | $2,427 | | $2,427 |
| CVPIA/RF | | | | $0 | $1,250 | | | $1,250 | | $1,250 |
| Matching | | | | $0 | | | | $0 | $197 | $197 |

## ATTACHMENT 1

| Science | CALFED | DWR | DFG | State Subtotal | USBR | USGS | Other Federal Agencies [3] | Federal Subtotal | Local/User[2] | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| CALFED Science Approved Funding--Totals | $4,185 | $261 | $235 | $4,681 | $0 | $770 | $0 | $770 | | $5,451 |
| General Fund | $2,155 | $261 | $235 | $2,651 | | | | $0 | | $2,651 |
| SWP | | | | $0 | | | | $0 | | $0 |
| Proposition 13 | $2,030 | | | $2,030 | | | | $0 | | $2,030 |
| Prop 204 | | | | $0 | | | | $0 | | $0 |
| Other Federal Funding | | | | | | $770 | | $770 | | $770 |
| variance program/funding4 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| IEP Approved Funding | $0 | $6,223 | $1,828 | $8,051 | $5,250 | $622 | $1,035 | $6,907 | $197 | $15,155 |
| General Fund | | | $625 | $625 | | | | $0 | | $625 |
| SWP | | $6,223 | | $6,223 | | | | $0 | | $6,223 |
| Proposition 13 | | | | $0 | | | | $0 | | $0 |
| Other State Funding[1] | | | $1,203 | $1,203 | | | | $0 | | $1,203 |
| Water & Related Resources | | | | $0 | $4,000 | | | $4,000 | | $4,000 |
| Other Federal Funding | | | | $0 | | $622 | $1,035 | $1,657 | | $1,657 |
| CVPIA/RF | | | | $0 | $1,250 | | | $1,250 | | $1,250 |
| Matching | | | | $0 | | | | $0 | $197 | $197 |

[1] Includes Interagency Ecological Program funding from Striped Bass Stamp Fund, Environmental License Plate, Prop 99 and Preservation funds.

[2] For local/User funding, include only projected matching funds associated with grants, loans and other local assistance. SWP and CVPIA RF should be listed under DWR and USBR respectively.

[3] Funding for other federal agencies include IEP funding for FWS, USACE, NMFS, and EPA.

[4] Variance is identified only for CALFED Science Program portion of the budget

Attachment 2

Active Issues
CALFED Science Program

- Arsenic
- Battle Creek—review of a number of technical restoration issues
- CALSIM model review
- Climate change, hydrological conditions, and probabilistic forecasting
- Cross-program critical unknowns in the Delta
- Cross-watershed multidisciplinary comparison and conceptual model
- Delta cross channel—basic fish, flow, and junction questions
- Delta smelt
- Delta wetlands technical review
- Fish screens—upper watershed, Delta, linking screens to immediate ecosystem, trucking and handling studies, etc.
- Floodplains
- Gaming model—incorporating new information by linking population models to current gaming
- Gravel augmentation
- Hatcheries—role in restoration at all levels of aggregation
- Indirect mortality of fish in Delta--Delta predation, etc.
- Invasive species
- Issues associated with 8500 cfs decision
- Larval fish
- Lower Yuba—studies defining restoration potential
- Mercury—statewide mercury studies
- NMFS screen criteria
- North Delta flood control model—peer review
- Organic carbon
- Restoration science – update and refine 12 uncertainties
- River restoration--adaptive management forums
- San Joaquin River DO
- San Joaquin River water quality
- San Joaquin salmon migration
- San Joaquin salt balance
- Sediment budget—watershed-wide sediment budget assessment in context of riverine, floodplain, Delta, and Bay restoration activities
- Shallow water fish community use
- Shallow water restoration
- Suisun Marsh
- SWP and CVP fish screens (state of knowledge and research agenda)
- Water operations/EWA
- Water quality--Endocrine disruptors, baseline Delta conditions, toxic-related biomarkers in juvenile salmon
- Water supply reliability—CALFED-wide performance assessment

# List of Funded Projects

## Task 2: Articulate, test, refine, and grow understandings about natural and human systems

Investing in Critical Unknowns(need to be ordered)

- Effects of toxicants on juvenile salmon—reconnaissance study in south delta to see if effects can be detected
- Collaborated with CA Sea Grant to solicit proposals for postdoctoral research in several issue areas
- Developing a flow and sediment transport model for channel and floodplain restoration on the sacramento river
- Ecological evaluation of Yolo bypass to support floodplain restoration
- Development of long-term hydrological models in support of dissolved oxygen management in stockton ship channel and san joaquin river
- Fundamental hydrodynamic and transport mechanisms in the delta
- Heavy metal and mercury concentrations in bed sediments and floodplains of clear creek watershed
- Genetic identification methods for spring run chinook salmon in the sacramento watershed
- Delta island subsidence and accretion (cost share with DWR)
- The spatial ecology and population dynamics of Delta Smelt revealed by otolith biogeochemistry
- Invasive species in ports and harbors

Filling Monitoring Gaps

- Pilot Wetlands Monitoring—organized multidisciplinary team to conduct integrated monitoring of restoration sites from San Pablo Bay to the Delta and developed monitoring strategy
- Replaced in-situ flow monitoring equipment in the Delta
- Co-sponsored research on indictors linking toxicants to wetland ecological health

Science in Support of Management

- Delta Cross Channel studies (funded initial year, cost-shared with Conveyance Program)

Investing in Analysis of Data

- Delta water quality: analysis of existing data to establish a baseline (cost-shared with Drinking Water Program)
- IEP fish presence, abundance, and location data—identifying patterns and controlling processes

## Task 3: Integrate the use of Best Available Scientific Understandings and Practices Throughout CALED

Peer Review

- Collaborated with the Ecosystem Restoration Program to update peer review process in PSP
- Co-sponsored peer review of north Delta flood models with Levee Program
- Conducted review of portions of the Delta Wetlands technical studies
- Initiating Process to peer review CALSIM and its applications
- Providing advice to WUE on defining the role of an external science review committee

- Collaborating with IEP to integrate peer review into the proposal-workplan development and selection process

Partnerships and Collaboration

- Provided staff and start-up funds for the Bay Delta Science Consortium, including planning co-location of DWR, CDFG, USFWS, and USGS scientists and field staff

Promoting Publication

- Sponsored symposium and edited publication of papers on larval fish

Enhancing Public Access to Data

- Sponsored the development of a data management strategy

## Task 4: Provide Authoritative and Unbiased Descriptions of the State of Scientific Knowledge

Issue Workshops

- Water Management workshop
- Salmon and EWA water management, summer '01 and '02
- Delta smelt, September '01 and '02
- Strategic plan for CALFED mercury studies--workshop organization underway (to be held late fall '02)
- Instream flow models
- Supported ERP Science Board's adaptive management workshop

White Papers

- Sediment budget and controlling processes throughout the watershed—putting restoration plans in the context of sediment availability
- Evaluate implications of climate variability and climate change for water management and proposed CALFED Actions
- Arsenic—geochemical and microbial processes, drinking water use, and potential conjunctive use issues
- Delta smelt research agenda—sponsored IEP project work team development and completion of draft white paper
- Szobzack paper..what?

**Task 5: Evaluate Technical Performance of CALFED Bay-Delta Program**

Science Advisors and Boards

- Engaged in discussions with the National Academy of Sciences and developed plans for a review of the Science Program in spring, '03

Expert Panels

- Established expert panel for multidisciplinary review of Delta projects linked to flow and water quality changes (San Joaquin River DO; Delta Cross Channel studies)
- Supported expert panel review of Upper Yuba River studies

EWA Technical Review

- Convened first independent review of EWA technical issues and issued the first report of the panel
- Published description of EWA decision tree and supporting information developed by Management Agency biologists
- Published science agenda for

Performance Measures

- Began development of a conceptual model for evaluating changes in supply reliability associated with CALFED actions
- Retained expert advisor to help each program development and use performance measures

## Task 6: Establish and Improve Communication Pathways

Conferences

- Sponsored first CALFED Science Conference, Sacramento, 2000
- Co-Sponsored 2001 State of the Estuary Conference
- Co-Sponsored Pacific Climate Conference, 2001, 2002
- Co-Sponsored Society of Environmental Toxicology and Chemistry Conference, 2002
- Co-Sponsored AFS Early Life History Meeting, 2003
- Sponsored 2nd CALFED Science Conference, Sacramento, 2003
- Co-Sponsored American River Conference, 2002

Educational Material

- Scientific studies in the Delta--video
- Water Education Foundation Delta Flow Video
- Initiated development of communication strategy for the Science Program

Online Science Journal

- Funded the development of a new online series devoted to publication of scientific studies on water issues in California; journal editors have accepted two manuscripts for review and the digital publication process is starting

Fact Sheets

- Delta Cross Channel studies fact sheet published in *Estuary*
- Delta shallow water habitat fact sheet published in *Estuary*
- River restoration fact sheet in progress

Science Program Activity Reports

- Presentation at Estuarine Research Federal conference on adaptive management experiments within CALFED Bay-Delta Program
- Briefed US GAO on the structure of the Science Program
- Initiated development of Science Program web site

## Program Accomplishments, Year 2

## Goal: Articulate, test, refine, and grow understandings about natural and human systems

- Developed a system of ”science agendas” which translate management questions and the current state of knowledge into questions that can be addressed by research. We currently have agendas for restoration in each ERP region; shallow water habitat management in the Delta; water management, salmon, and smelt. During Year 3, we will be developing science agendas on: the role of fish screens in the broader ecosystem context, drinking water quality issues, arsenic processes related to conjunctive use,
- Pilot Wetlands Monitoring—organized multidisciplinary team to conduct integrated monitoring of restoration sites from San Pablo Bay to the Delta and developed monitoring strategy
- Replaced in-situ flow monitoring equipment in the Delta
- Co-sponsored research on indictors linking toxicants to wetland ecological health
- Delta Cross Channel studies (funded initial year, cost-shared with Conveyance Program)
- Delta water quality: analysis of existing data to establish a baseline (cost-shared with Drinking Water Program)
- IEP fish presence, abundance, and location data—identifying patterns and controlling processes

## Goal: Integrate the use of Best Available Scientific Understandings and Practices Throughout CALED

- Collaborated with the Ecosystem Restoration Program to update peer review process in PSP
- Co-sponsored peer review of north Delta flood models with Levee Program
- Conducted review of portions of the Delta Wetlands technical studies
- Initiating Process to peer review CALSIM and its applications
- Providing advice to WUE on defining the role of an external science review committee
- Collaborating with IEP to integrate peer review into the proposal-workplan development and selection process
- Provided staff and start-up funds for the Bay Delta Science Consortium, including planning co-location of DWR, CDFG, USFWS, and USGS scientists and field staff

Promoting Publication

- Sponsored symposium and edited publication of papers on larval fish

Enhancing Public Access to Data

- Sponsored the development of a data management strategy

## Task 4: Provide Authoritative and Unbiased Descriptions of the State of Scientific Knowledge

Issue Workshops

- Water Management workshop
- Salmon and EWA water management, summer ’01 and ‘02
- Delta smelt, September ’01 and ‘02
- Strategic plan for CALFED mercury studies--workshop organization underway (to be held late fall ’02)
- Instream flow models
- Supported ERP Science Board’s adaptive management workshop

White Papers

- Sediment budget and controlling processes throughout the watershed—putting restoration plans in the context of sediment availability
- Evaluate implications of climate variability and climate change for water management and proposed CALFED Actions
- Arsenic—geochemical and microbial processes, drinking water use, and potential conjunctive use issues
- Delta smelt research agenda—sponsored IEP project work team development and completion of draft white paper
- Szobzack paper..what?

**Task 5: Evaluate Technical Performance of CALFED Bay-Delta Program**

Science Advisors and Boards

- Engaged in discussions with the National Academy of Sciences and developed plans for a review of the Science Program in spring, '03

Expert Panels

- Established expert panel for multidisciplinary review of Delta projects linked to flow and water quality changes (San Joaquin River DO; Delta Cross Channel studies)
- Supported expert panel review of Upper Yuba River studies

EWA Technical Review

- Convened first independent review of EWA technical issues and issued the first report of the panel
- Published description of EWA decision tree and supporting information developed by Management Agency biologists
- Published science agenda for

Performance Measures

- Began development of a conceptual model for evaluating changes in supply reliability associated with CALFED actions
- Retained expert advisor to help each program development and use performance measures

## Task 6: Establish and Improve Communication Pathways

Conferences

- Sponsored first CALFED Science Conference, Sacramento, 2000
- Co-Sponsored 2001 State of the Estuary Conference
- Co-Sponsored Pacific Climate Conference, 2001, 2002
- Co-Sponsored Society of Environmental Toxicology and Chemistry Conference, 2002
- Co-Sponsored AFS Early Life History Meeting, 2003
- Sponsored 2nd CALFED Science Conference, Sacramento, 2003
- Co-Sponsored American River Conference, 2002

Educational Material

- Scientific studies in the Delta--video
- Water Education Foundation Delta Flow Video
- Initiated development of communication strategy for the Science Program

Online Science Journal

- Funded the development of a new online series devoted to publication of scientific studies on water issues in California; journal editors have accepted two manuscripts for review and the digital publication process is starting

Fact Sheets

- Delta Cross Channel studies fact sheet published in *Estuary*
- Delta shallow water habitat fact sheet published in *Estuary*
- River restoration fact sheet in progress

Science Program Activity Reports

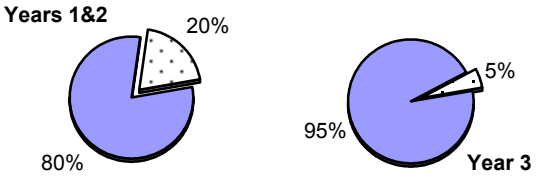
- Presentation at Estuarine Research Federal conference on adaptive management experiments within CALFED Bay-Delta Program
- Briefed US GAO on the structure of the Science Program
- Initiated development of Science Program web site

# CALFED Science Program Record of Decision: Progress at a Glance

**Progress toward ROD**

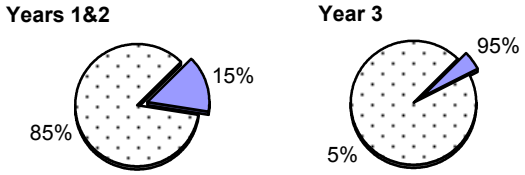
Percentage complete  Percentage incomplete

## Task 1. Oversight and Management



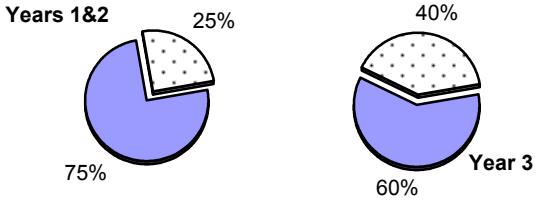

Y1&2: Need additional staff
Y3: ---

## Task 2. Articulate, test, refine, and grow understandings



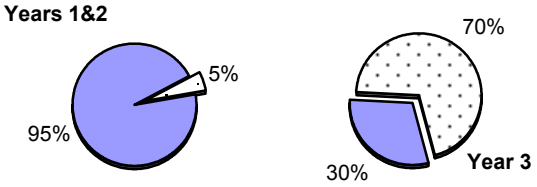

Y1&2: ---
Y3: Lack of funding

## Task 3. Integrate use of best available scientific understandings and practices throughout CALFED




Y1&2: Developed tools and guidance; sponsored activities; incomplete use across CALFED
Y3: ---

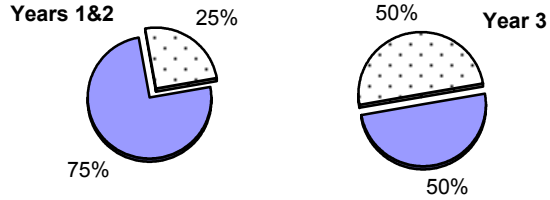
## Task 4. Provide authoritative and unbiased descriptions of the state of scientific knowledge




Y1&2: Developed and implemented public workshop process; initiated white papers; some requests could not be met with existing staff

Y3: Requests for assistance exceed staff capacity; lack of funding impedes development of materials required for reviews and workshops and limits number of workshops that can be sponsored

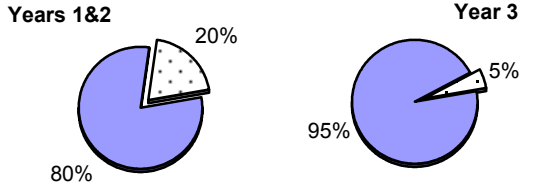
## Task 5. Evaluate technical performance of CALFED




Y1&2: An independent evaluation system was established and successfully implemented in some program areas; templates for performance assessment within programs were developed but not yet implemented

Y3: Most ongoing reviews continue; use of independent reviews within programs are dependent on funding and modifications of workplans

## Task 6. Establish and improve communication pathways




Y1&2: Significant progress was made establishing forums where technical issues are discussed

Y3: Funding levels will severely restrict established forums

# CALFED Science Program Record of Decision: Progress at a Glance

**Progress toward ROD:** Years 1&2 Year 3